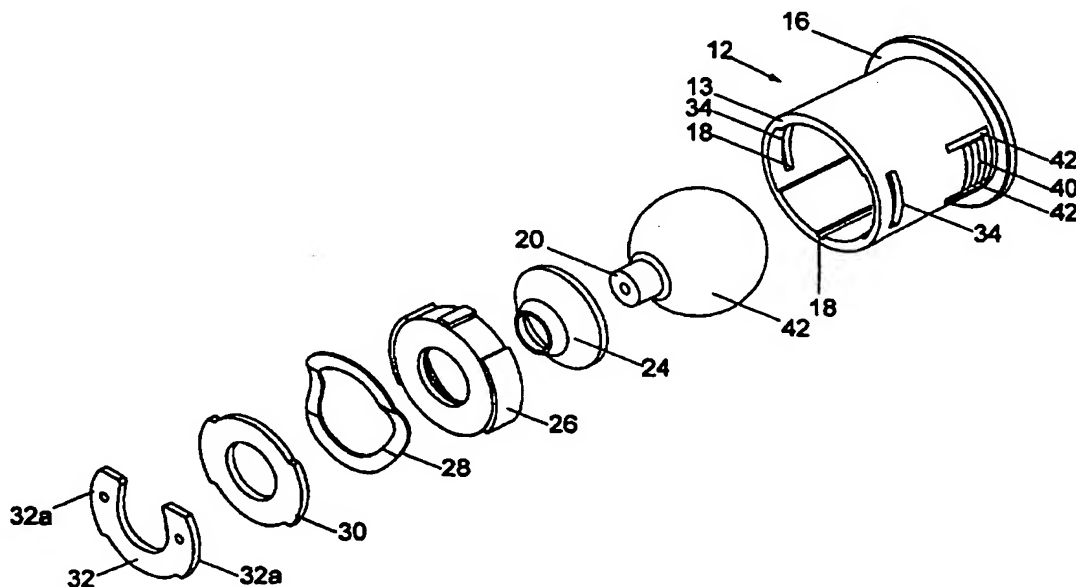




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(54) Title: SENSOR MOUNTING**(57) Abstract**

A mounting for attaching a sensor (10) in a vehicle bumper comprises a housing (12) within which a sensor holder (14) can be angularly adjusted. The sensor holder (14) has a part-spherical surface which is biased against a part-spherical seat (22) within the housing (12) by means of a spring (28) acting through a bearing rest (26) and a bearing cup (24), these parts being retained within the housing (12) by a thrust washer (30) and a retaining clip (32).

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1 **SENSOR MOUNTING**

2

3 This invention relates to a sensor mounting
4 particularly, but not exclusively, for mounting a
5 sensor of a reversing aid system at a vehicle bumper.

6

7 Systems for indicating the presence of an obstruction
8 behind the vehicle to the driver when reversing use a
9 plurality of ultrasonic or other electromagnetic
10 sensors mounted at the rear of the vehicle. The
11 orientation of the sensors must be correctly aligned
12 for the system to operate correctly.

13

14 Known systems have fixed sensors mounted on brackets at
15 the rear of the vehicle or at the vehicle's bumper. A
16 specific mounting or bracket is thus required for every
17 different model of vehicle to ensure correct sensor
18 alignment.

19

20 Systems are also being developed which are relatively
21 insensitive to sensor orientation, but these rely on
22 more expensive sensor transducers and additional
23 electronic processing, or which make use of software to
24 compensate for angular misalignment. However, such
25 proposals involve significant additional costs.

1 The present invention provides a sensor mounting
2 comprising a housing, a sensor holder secured within
3 the housing for adjustment about two axes, and means
4 for maintaining the sensor holder in a fixed
5 orientation within the housing after adjustment.
6

7 Preferably, the housing has a part-spherical internal
8 surface engaging a part-spherical outer surface of the
9 sensor holder, whereby the orientation of the sensor
10 holder with respect to the housing may be continuously
11 adjusted.
12

13 Said maintaining means may suitably comprise resilient
14 means acting between the housing and the sensor holder.
15

16 The housing is preferably adapted to be secured in a
17 vehicle bumper. Typically, the housing has a generally
18 cylindrical outer shape for reception in a circular
19 aperture in a vehicle bumper, and a front flange for
20 abutting against the outer surface of the vehicle
21 bumper.
22

23 Teeth may be provided on the outer surface of the
24 housing adjacent the rear of said flange, to grip the
25 vehicle bumper.
26

27 The housing may suitably comprise a front portion
28 defining a cavity in which the sensor holder can be
29 inserted, and a rear portion retaining the sensor
30 holder within the housing. The rear portion may be held
31 within the front portion by a spring clip.
32

33 The sensor may be an ultrasonic or other sensor. It
34 may be a transmitter, receiver, or transceiver.
35

36 The mounting facilitates mounting a sensor at a bumper,

1 for example, for retrofitting of a reversing aid
2 system. The adjustability provided by the mounting
3 alleviates the criticality of the position and
4 orientation of the mounting itself. It may enable the
5 mounting to be arranged, for example, on a downwardly
6 directed portion of a curved bumper with the sensor
7 orientated within the mounting for correct operation.

8
9 The invention will now be described, by way of example
10 only, with reference to the accompanying drawings, in
11 which:

12
13 Fig. 1 is an exploded perspective view of a sensor
14 assembly embodying the invention;
15 Fig. 2 is a cross-sectional side elevation of the
16 assembly of Fig. 1 in a first configuration;
17 Fig. 3 is a similar view to that of Fig. 2 but in
18 a second configuration; and
19 Fig. 4 is a cross-sectional plan view of the
20 assembly.

21
22 Referring to the drawings, a sensor 10 (Figs. 2 to 4)
23 is mounted to a panel such as a vehicle bumper (not
24 shown) by a sensor housing to be described. The sensor
25 10 will typically be an ultrasonic transmitter/receiver
26 forming part of a vehicle reversing aid, but could
27 alternatively be an infra-red or microwave sensor.

28
29 The sensor mounting comprises a housing 12 and a sensor
30 holder 14.

31
32 The housing 12 has a body 13 of generally cylindrical
33 formation with a front flange 16 and an internal
34 surface formed with axial slideways 18. The sensor
35 holder 14 is suitably of an elastomeric material
36 defining an internal cavity in which the sensor 10 is

1 resiliently gripped, and an outer surface in the form
2 of a part sphere with a projecting cylindrical tail 20.

3

4 As seen in Figs. 2 to 4, the interior of the housing
5 body 13 is formed in its front portion to provide a
6 part-spherical bearing surface 22 within which the
7 part-spherical sensor holder 14 may be rotated about x
8 and y axes.

9

10 The sensor holder 14 is retained within the housing
11 body 13 by means of a bearing cup 24 and a bearing rest
12 26. The bearing cup 24 is suitably of a low friction
13 material. The bearing rest 26 is urged in the forward
14 direction by a spring, in this instance in the form of
15 a wave washer 28, acting between the bearing rest 26
16 and a thrust washer 30 retained in position by a spring
17 clip 32 having opposed lugs 32a engaging in slot 34
18 towards the rear of the housing 12.

19

20 The sensor is connected to appropriate circuitry by a
21 cable 36 (shown in Fig. 2 only). In the case of an
22 ultrasonic sensor, if a screened cable is used then the
23 appropriate electronics may all be at a remote
24 location. In an alternative arrangement, a
25 preamplifier may be mounted behind the sensor within
26 the sensor holder 14, in which case an unscreened cable
27 may be used.

28

29 The housing 12 is provided with serrations 40 on
30 resilient fingers formed between slots 42 (Fig. 1) in
31 the material of the housing body 13. In this way, the
32 sensor mounting can be inserted into a hole of
33 appropriate size drilled in a vehicle bumper, and will
34 be held in position by the serrations 40 gripping on
35 the edge of the hole. A trim washer 44 (Figs. 2 to 4)
36 may be provided between the flange 16 and the vehicle

1 bumper to cover any irregularities in the hole. Once
2 the assembly is in the selected position on the bumper,
3 the angular orientation of the sensor 10 may be
4 adjusted from the exterior simply by pushing its front
5 face with the finger against the resilience of the
6 spring 28 and rotating until the desired orientation is
7 achieved. The sensor 10 is then released and is
8 retained in that orientation by the spring 28 urging
9 the sensor holder 14 against the housing 12. A typical
10 automobile installation will require the capability of
11 adjusting to 15° above and 10° below the horizontal and
12 5° to either side, and it is therefore convenient to
13 permit angular adjustment of slightly more than 15° in
14 all directions.

15
16 In a typical arrangement, the parts 12, 26, 30 and 32
17 may suitably be formed by injection moulding of UV
18 stabilised ABS.

19
20 Although described with particular reference to
21 mounting in a vehicle bumper, the sensor assembly may
22 be mounted in other ways, for example on a bracket
23 secured within a plastic bumper, on a bracket secured
24 to a vehicle underbody, or within a box secured to a
25 vehicle body.

26
27 Modifications may be made to the foregoing embodiment
28 within the scope of the present invention. As one
29 example, instead of using a spring to bias the sensor
30 holder against a seat, it would be possible to have the
31 housing of a resilient material to resiliently grip the
32 sensor holder, and in this case the sensor holder could
33 be freed for adjustment by resilient deformation of the
34 holder by a user. Alternatively, the sensor holder
35 could be manipulated to the desired orientation by
36 means of an elongated tail portion. The cooperating

1 part-spherical surfaces could be provided with
2 interengaging formations such as ridges and grooves to
3 provide a click-stop action in predetermined
4 orientations.

5

6 The invention thus provides a mounting arrangement
7 which allows a low cost sensor to be mounted on and
8 adjusted to suit a wide range of vehicles in a simple
9 manner.

1 CLAIMS

2

3 1. A sensor mounting comprising a housing, a sensor
4 holder secured within the housing for adjustment
5 about two axes, and means for maintaining the
6 sensor holder in a fixed orientation within the
7 housing after adjustment.

8

9 2. A sensor mounting according to claim 1, in which
10 the housing has a part-spherical internal surface
11 engaging a part-spherical outer surface of the
12 sensor holder, whereby the orientation of the
13 sensor holder with respect to the housing may be
14 continuously adjusted .

15

16 3. A sensor mounting according to claim 1 or claim 2,
17 in which said maintaining means comprises
18 resilient means acting between the housing and the
19 sensor holder.

20

21 4. A sensor mounting according to any preceding
22 claim, in which the housing is adapted to be
23 secured in a vehicle bumper.

24

25 5. A sensor mounting according to claim 4, in which
26 the housing has a generally cylindrical outer
27 shape for reception in a circular aperture in a
28 vehicle bumper, and a front flange for abutting
29 against the outer surface of the vehicle bumper.

30

31 6. A sensor mounting according to claim 5, in which
32 teeth are provided on the outer surface of the
33 housing adjacent the rear of said flange.

34

35 7. A sensor mounting according to any preceding
36 claim, in which the housing comprises a front

- 1 portion defining a cavity in which the sensor
2 holder can be inserted, and a rear portion
3 retaining the sensor holder within the housing.
4
5 8. A sensor mounting according to claim 7, in which
6 the rear portion is held within the front portion
7 by a spring clip.
8

1 / 2

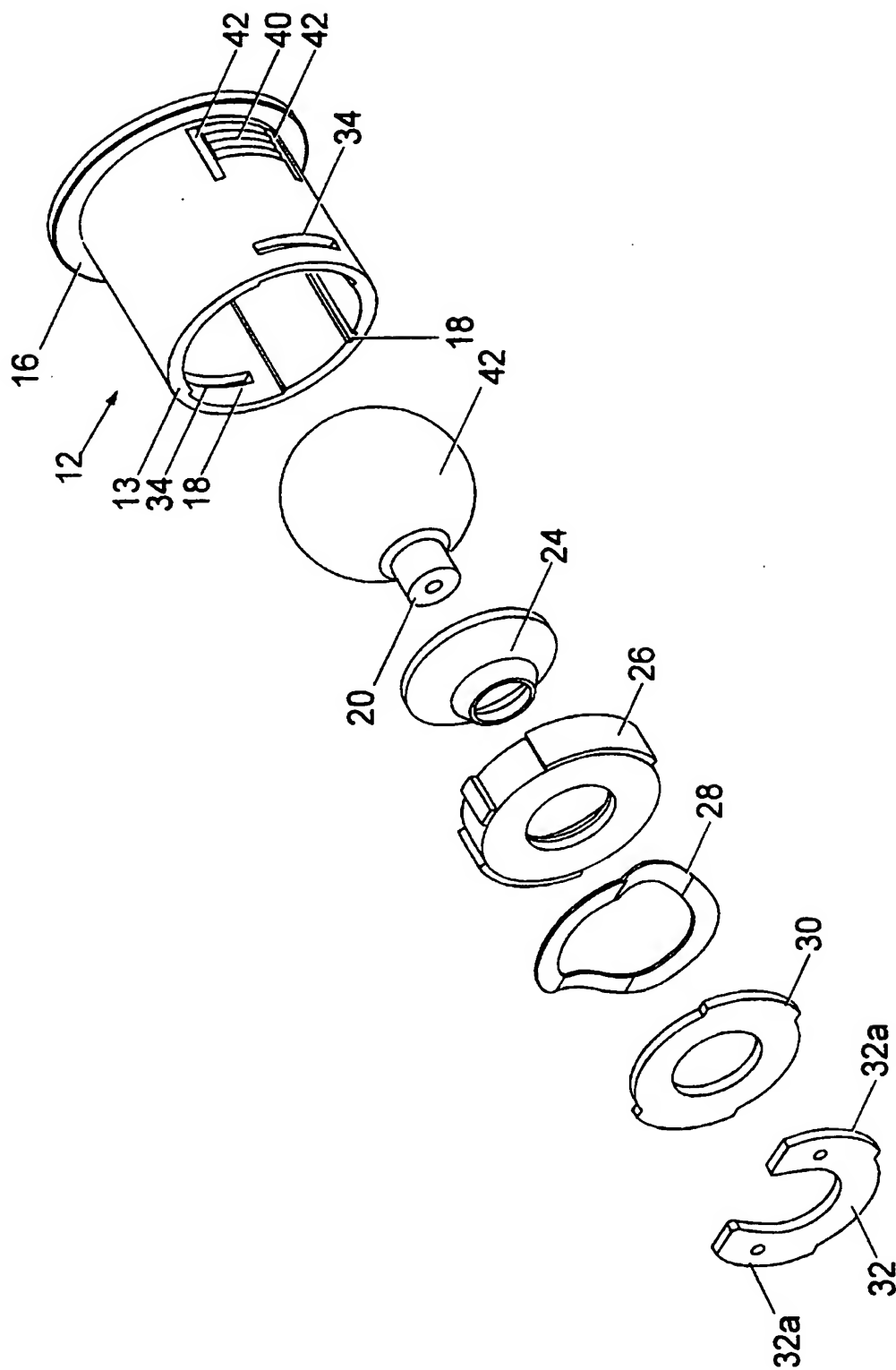


Fig. 1

Fig. 2

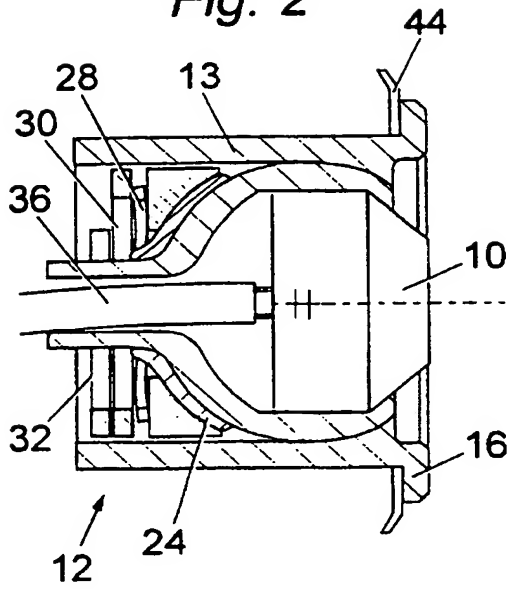


Fig. 3

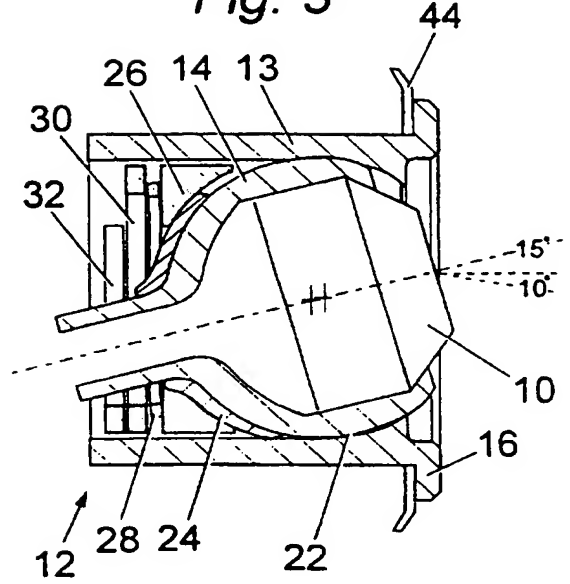
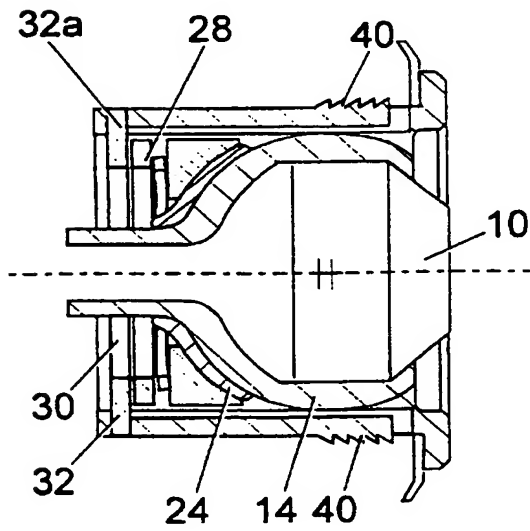


Fig. 4



INTERNATIONAL SEARCH REPORT

Int. l. Application No
PCT/GB 97/01564

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B60R19/48 G01D11/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B60R G01D G10K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 096, no. 007, 31 July 1996 & JP 08 074825 A (NILES PARTS CO LTD), 19 March 1996, see abstract	1-8
Y	EP 0 131 654 A (N.V.OPTISCUE INDUSTRIE "DE OUDE DELFT") 23 January 1985 see page 6, line 25 - page 7, line 12; figure 2	1-8

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Date of the actual completion of the international search

25 September 1997

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